CLAIMS

1. A method of processing signals received corresponding to a signal emitted comprising by recurrence two pulses, a Doppler tolerant broadband pulse and a Doppler intolerant broadband pulse, said method comprising:
- a step of detecting objects (S3) performed on the part of the signal received corresponding to the first pulses and providing an alarm for each object detected, and
- a step of classifying the objects detected (S8) characterized in that the classification (S8) of the objects detected is performed on the part of the signal received corresponding to the Doppler intolerant pulses for the alarms satisfying at least one predetermined criterion (S3, S4).

2. The method of processing signals as claimed in the preceding claim, characterized in that the predetermined criterion applied (S3) to the alarms comprises a comparison of the alarms with a predetermined threshold.

3. The method of processing signals as claimed in any one of the preceding claims, characterized in that it comprises a step of first matched filtering of the part of the signal received corresponding to the Doppler tolerant pulses (S2) before the detection of objects (S3) providing an energy $E_{HFM}(v,t)$.

4. The method of processing signals as claimed in the preceding claim, characterized in that the first matched filtering (S2) comprises:
- a step of correlating the part of the signal received corresponding to the Doppler tolerant pulses,

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     -     a step of rms detection of the correlated signal providing signals representing the energy as a function of channel and time $E_{HFM}(v,t)$.

5   5.   The method of processing signals as claimed in either of claims 3 and 4, characterized in that the detection of the objects (S3) comprises:

-     a step of searching for the local energy maxima $E_{HFM}(v,t)$ by comparison with a predetermined energy
10   threshold E_s,

-     a step of normalizing the maxima obtained by calculation for each local maxima of the value $(E_{HFM}-M)/\sigma$, M being the mean of the reference noise and σ the corresponding standard deviation,

15   -   a step of eliminating the maxima of lower normed energy,

-     a step of detecting the objects comprising the comparison of alarms corresponding to normed maxima not eliminated greater than a predetermined
20   threshold of normed energy E_{SN}.

6.   The method of processing signals as claimed in any one of the preceding claims, characterized in that it comprises a step (S6) of estimating Doppler d_i of the
25   alarms i corresponding to the Doppler intolerant pulses for the alarms satisfying at least one predetermined criterion (S3, S4), and/or the associated standard deviations σ_{d_i}.

30   7.   The method of processing signals as claimed in any one of the preceding claims, characterized in that it comprises a step of estimating the Doppler of the alarms (S6).

35   8.   The method of processing signals as claimed in the preceding claim, characterized in that the inherent Doppler is estimated (S7) at each instant:

- either on the basis of a Doppler of the part of the signal received corresponding to the reverberation of the Doppler intolerant pulses,

- or on the basis of the spectrum of the reverberation of the part of the signal received corresponding to the pulses FP when pulses FP have been emitted.

9. The method of processing signals as claimed in any one of the preceding claims, characterized in that it comprises:

- a step of forming (S1) a first channel comprising the part of the signal received corresponding to the Doppler tolerant pulses, and a second channel comprising part of the signal received corresponding to the Doppler intolerant pulses,

- the step of first matched filtering of the first channel (S2) before the detection of objects (S3),

- the step of detecting the objects (S3) providing an alarm for each object detected,

- the step of selecting the alarms satisfying at least the predetermined criterion (S3, S4) in the second channel,

- a step of second matched filtering of the second channel (S5) around the alarms selected,

- the step of Doppler estimation of the alarms (S6) selected in the second channel,

- the step of estimating inherent Doppler (S7),

- the classifying (S8) of the objects by discrimination between the bottom echoes and the true echoes on the basis of the values of the Doppler of the alarms selected in the second channel and of the inherent Doppler,

- a step of eliminating (S9) on the first channel the alarms detected corresponding to bottom echoes.

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10. The method of processing as claimed in any one of the preceding claims, characterized in that it uses jointly a pulse of HFM type, and a pulse of BPSK type, the two pulses being emitted in the same recurrence.

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11. An active sonar comprising,
- means of emitting a signal comprising by recurrence two pulses, a Doppler tolerant broadband pulse and a Doppler intolerant broadband
10 pulse, and
- means of receiving the signal emitted implementing the method of processing signals as claimed in any one of claims 1 to 10.

15 12. The active sonar as claimed in the preceding claim, characterized in that the means of emission emit the two pulses at different instants with totally or partly overlapping frequency bands.

20 13. The active sonar as claimed in any one of the preceding claims, characterized in that the means of emission emit the two pulses simultaneously with distinct frequency bands.

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